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TO: Federal Communications Commission

RE: BPL (ET Docketts 03-104 and 04-37)

FROM: Anthony Dorbuck, 595 E. Main St. New Britain, CT 06051-2043

Present rules regarding Carrier Current Systems (CCS) may be suitable for LF applications but should not be applied at HF. This is because radiation terms can usually be neglected at LF but become predominant with increasing frequency.

For CCS purposes, a power line should be considered as single horizontal wire above ground at height, h , with an image conductor below ground at depth, h , with opposing current. In the plane of this array, at some point, p , at a distance, r , from ground, note that the distances are $r - h$ from the wire and $r + h$ from its image.

For an h of 0, ~~xxxx~~ the fields at p generated by currents in the conductor and its image would cancel since the currents are opposing. For h greater than 0, the fields would still cancel. But not exactly. This is because the speed of electromagnetic radiation is finite. There would be a delay of $2h/c$ where c is the speed of light or 9.82-E/08 feet/second. Assuming a utility-pole height of 40 feet, the delay would be $80/c$ or 81.5 ns.

The phase shift resulting from this delay can be computed from ϕ equals $360 \times f \times (\text{delay})$. For a frequency of 200 kHz, the phase shift ϕ would be 5.86°. The component resulting from the delay can be computed from $2\text{SIN}(\phi/2)$ giving a relative value of 0.102. This number represents energy irretrievably ~~xxxxxx~~ lost in the form of radiation. But the value is still low (-19.8 dB) compared to an uncanceled component (a value of 1.0). Considered somewhat differently, the power line is only 0.0163 wavelengths above ground and most would conclude it would be a very poor antenna.

On the other hand, things change ~~xxxx~~ radically at HF. For example, at a frequency of 3 MHz, the same power line would be 0.24 wavelengths above ground. In this regard, a wire up at utility-pole height would be the envy of radio amateurs, short-wave listeners, and others who use the HF spectrum but not BPL operators!!

While perhaps a misnomer, the term, "point source" should be confined to CCS systems where components die away as $1/r^2$, $1/r^3$ or in higher terms but where $1/r$ terms can be neglected. Separate rules are needed where radiation is a significant factor.

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